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Client Ref. No.: 99E142

CLAIMS

- 1 1. A method of making aluminum oxynitride, the method comprising:
2 introducing aluminum oxide particles into a chamber;
3 dispersing the particles within the chamber; and
4 forming the aluminum oxynitride comprising passing nitrogen gas over the dispersed
5 particles.
- 1 2. The method of claim 1, wherein forming the aluminum oxynitride comprises
2 heating the particles.
- 1 3. The method of claim 1, further comprising introducing carbon into the chamber to
2 form a mixture comprising aluminum oxide and carbon.
- 1 4. The method of claim 1, further comprising introducing a reducing agent into the
2 chamber to form a mixture comprising aluminum oxide and the reducing agent.
- 1 5. The method of claim 1 wherein forming the aluminum oxynitride comprises
2 heating the mixture.
- 1 6. A method of making aluminum oxynitride, the method comprising:
2 introducing a mixture comprising aluminum oxide and carbon into a chamber;
3 agitating the mixture within the chamber; and
4 heating the mixture to make aluminum oxynitride.
- 1 7. The method of claim 6, further comprising:
2 introducing nitrogen gas into the chamber.
- 1 8. The method of claim 6, wherein agitating the mixture comprises rotating the
2 chamber.
- 1 9. The method of claim 6, further comprising:
2 cooling the aluminum oxynitride;

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3 removing the aluminum oxynitride from the chamber; and
4 introducing a second mixture comprising aluminum oxide and carbon into the
5 chamber.

1 10. The method of claim 6, further comprising:
2 forming the aluminum oxynitride into a transparent structure.

1 11. The method of claim 10, wherein forming the aluminum oxynitride comprises:
2 forming a green body comprising the aluminum oxynitride; and
3 sintering the green body.

1 12. The method of claim 11, further comprising:
2 isostatically pressing the sintered green body under heat.

1 13. The method of claim 6, wherein the aluminum oxynitride comprises Al_{23}
2 $_{1/3x}O_{27+x}N_{5-x}$, where $0.429 \leq x \leq 2$.

1 14. A method of making aluminum oxynitride, the method comprising:
2 introducing a first reaction mixture comprising aluminum oxide and carbon into a
3 chamber;
4 agitating the first reaction mixture within the chamber;
5 heating the chamber to a temperature to form aluminum oxynitride from the first
6 reaction mixture;
7 removing the aluminum oxynitride while maintaining the temperature of the chamber;
8 and
9 introducing a second reaction mixture comprising aluminum oxide and carbon into
10 the chamber while maintaining the temperature of the chamber.

1 15. The method of claim 14, further comprising:
2 introducing nitrogen gas into the chamber.

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1 16. The method of claim 14, wherein introducing the first reaction mixture comprises
2 introducing the first reaction mixture from a hopper.

1 17. The method of claim 14, wherein agitating the first reaction mixture comprises
2 rotating the chamber.

1 18. The method of claim 14, wherein the chamber comprises an exit opening and
2 removing the aluminum oxynitride comprises retracting a plunger within the chamber,
3 thereby allowing the aluminum oxynitride to flow through the exit opening.

1 19. The method of claim 14, further comprising:
2 forming the aluminum oxynitride into a transparent structure.

1 20. The method of claim 19, wherein forming the aluminum oxynitride comprises:
2 forming a green body comprising the aluminum oxynitride; and
3 sintering the green body.

1 21. The method of claim 20, wherein forming the aluminum oxynitride comprises:
2 isostatically pressing the sintered green body under heat.

1 22. The method of claim 14, wherein the aluminum oxynitride comprises Al_{23} .
2 $1/3xO_{27+x}N_{5-x}$, where $0.429 \leq x \leq 2$.

1 23. An aluminum oxynitride made according to the method of claim 6.

1 24. The aluminum oxynitride of claim 23, wherein the aluminum oxynitride
2 comprises $Al_{23-1/3x}O_{27+x}N_{5-x}$, where $0.429 \leq x \leq 2$.

3 25. A method of making aluminum oxynitride, the method comprising:
4 heating a chamber;
5 continuously introducing a reaction mixture comprising aluminum oxide and carbon
6 into the chamber;
7 agitating the reaction mixture within the chamber; and

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8 continuously providing the aluminum oxynitride.

1 26. The method of claim 25, further comprising:
2 forming the aluminum oxynitride into a transparent structure.

1 27. The method of claim 26, wherein forming the aluminum oxynitride comprises:
2 forming a green body comprising the aluminum oxynitride; and
3 sintering the green body.

1 28. The method of claim 27, wherein forming the aluminum oxynitride comprises:
2 isostatically pressing the sintered green body under heat.

1 29. The method of claim 25, wherein the aluminum oxynitride comprises $Al_{1/3}O_{2/3+x}N_{5-x}$, where $0.429 \leq x \leq 2$.
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